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By Keith Arnold

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WHAT THE STATES ARE DOING IN FOREST FIRE RESEARCH

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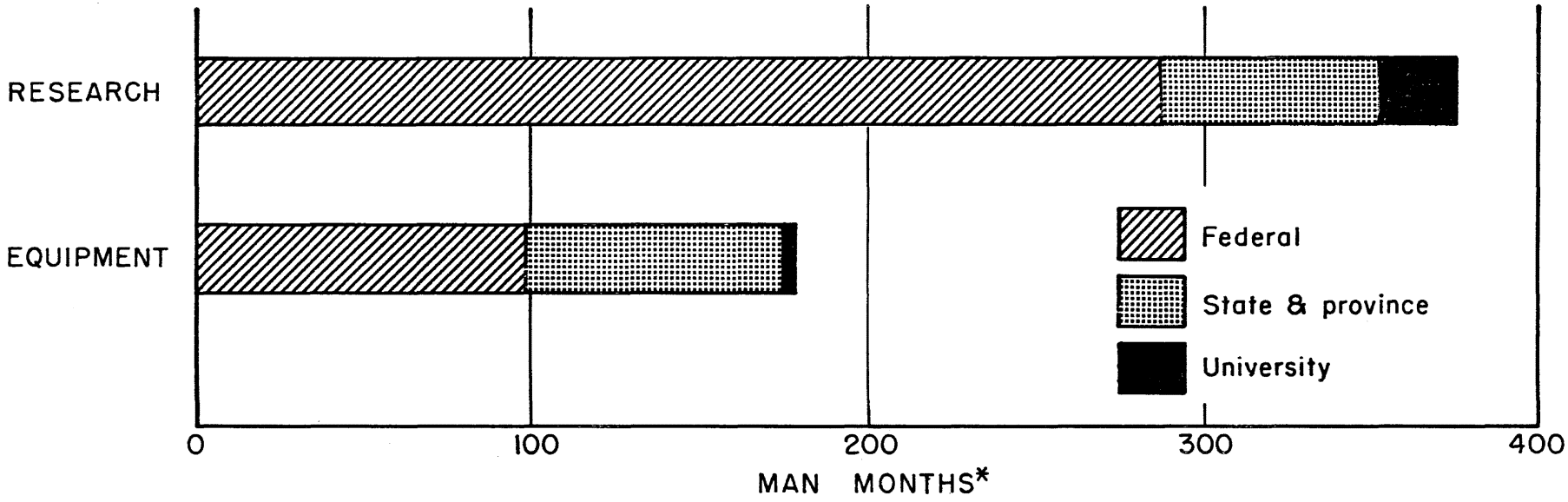
1/ Maintained by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of California, at Berkeley, California.

As you know, the Western Fire Research Council was recently organized to coordinate the forest fire research and development efforts of all agencies--federal and university as well as state. I was assigned the job of reporting to you what these activities are here in the West, how much of what is being done, and where and by whom. To find this out we conducted a preliminary survey. This is the first time a survey of this kind has been done, and I think you will agree with me that it reveals some very interesting facts, many of which definitely point up a need for coordination in order to develop better fire control in the West for all protection agencies.

First of all we were surprised at the number and kinds of things people are doing in the field of forest fire research. We find a marked increase, too, in participation by individual states and more cooperative programs between all research groups than ever before.

(Slide of bar graph No. 1 on screen.) The work is mainly of two types. One is development of equipment, which is basically an engineering job; the other, research, which now makes use of many sciences such as meteorology, physics, chemistry as well as those related to forestry. You will see why so many sciences are needed when we examine some of the research projects more closely.

CURRENT FIRE RESEARCH AND DEVELOPMENT EFFORT IN THE WEST



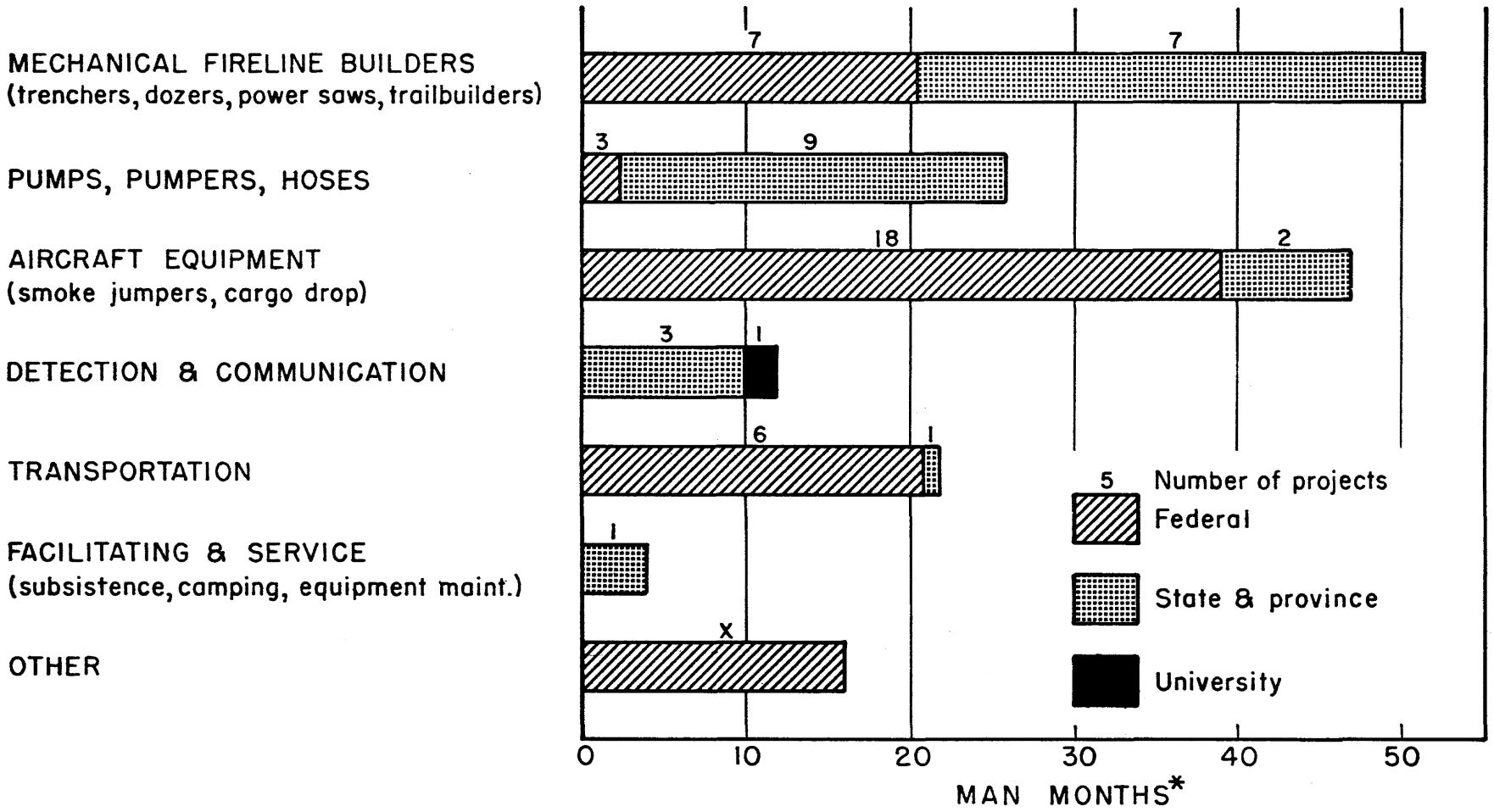
*Approximate

But first let's talk about the development of equipment. In general, here in the West (as you can see on this bar graph) the work is about equally divided between state and federal agencies. Although federal groups list more unit projects and more time spent, many of these projects are cooperative with states. A good example is the helicopter hose-tray, engineered and tested this year, which you will hear more about later in this program. Another is the powered trail grader from the North.

(Slide of bar graph No. 2 on the screen.) In current equipment development, states are doing the bulk of the work on pumps, pumpers, and improved parts for both. For instance, here is a new electric pump that works off the truck battery current that will be of interest to many of you. (Slide) Federal agencies continued to contribute improvements in air equipment used by smoke jumpers and cargo droppers--a logical division if you glance at the map. The forest service has a lot of roadless backcountry to protect. Both state and federal agencies were equally interested in line-building equipment.

No entirely new design projects were begun on major equipment in 1956. All agencies concentrated on improvements and testing of new parts on existing models. (Movie shown on tests. Slides shown of kinds of equipment.) Consequently, even though the number of projects appears to be considerable, a single item--like jumper gear--may account for five or six unit projects on different parts of the gear. Incidentally, the Aerial Center in Missoula has more concentrated team effort on their various problems than any other research group. It has paid off with fast results in the whole smoke jumper program.

CURRENT FIRE EQUIPMENT DEVELOPMENT IN THE WEST



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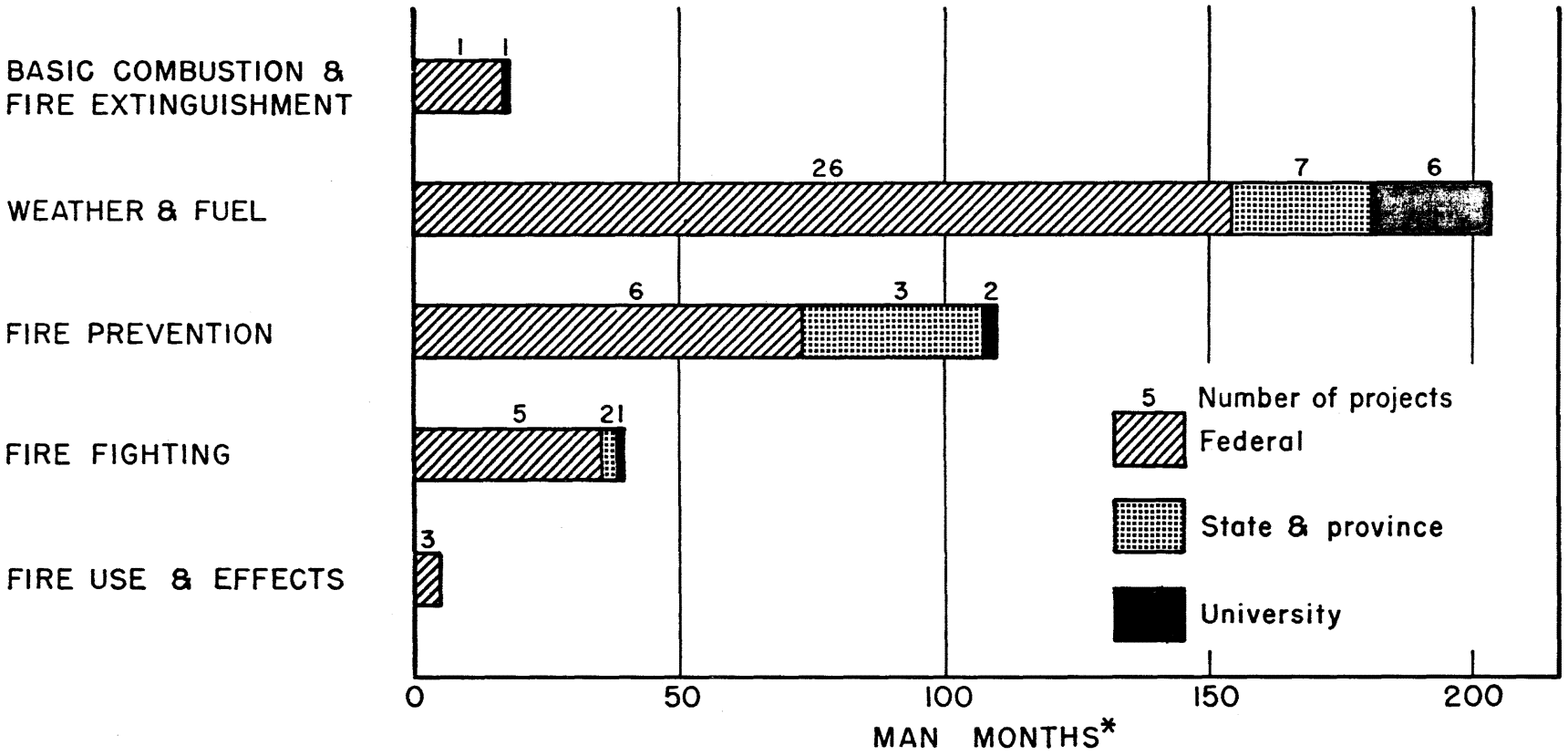
Another thing that whittles down the first impression of plenty of work for western fire-control needs, is a look at the number of men working together in any one place on any one problem. One-man projects are fairly common, and you all know how limiting that can be. Also, several agencies may be working on very similar items. Take slip-on pump units for instance. Everybody has one, but sometimes they don't know what the other fellow has--and maybe they'll like that one better.

When I looked at the survey summaries I was surprised to see that research was ahead of equipment development in the total number of man-months--377 for research to 183 for development.

(Slide of bar graph No. 3 on screen.) Federal agencies are still mainly responsible for research, especially in weather, where cooperative studies are being conducted between the Forest Service and the U. S. Weather Bureau's fire weather forecasting unit. States and Universities share evenly in their interest in fuel; studies are being done in Washington, Oregon, Montana and Idaho. Weather and fuel account for more than 200 of the 377 man-months spent on all research, but I should point out right here that 30-1/2 of those months are spent in compiling statistics--a time-consuming job that has to be done. Statistical work accounts for the bulk of the time in prevention studies too. Details are shown in table 1.

And while we're looking at prevention--here's an interesting thing. Less than one-half as much time is being spent for research on man-caused fires as on lightning-caused ones. Of the 4 unit projects on man-caused fires, 3 are statistical compiling--only one is in the analysis stage.

CURRENT FIRE RESEARCH EFFORT IN THE WEST



*Approximate

Table 1. CURRENT ANNUAL FIRE RESEARCH EFFORT IN THE WEST

PROJECT CLASSIFICATION	FEDERAL		STATE AND PROVINCE		UNIVERSITY		TOTAL	
	No. of Projects	MAN-MONTHS	No. of Projects	MAN-MONTHS	No. of Projects	MAN-MONTHS	No. of Projects	MAN-MONTHS
BASIC COMBUSTION AND FIRE EXTINGUISHMENT	1	17	1	1	--	--	2	18
FIRECLIMATE								
WIND STUDIES	2	18	--	--	--	--	2	18
FUEL MOISTURE	1	1/2	--	--	1	4	2	4-1/2
FOREST MICROCLIMATE	1	3	--	--	--	--	1	3
FIRE DANGER RATING (Rating improvement, build-up index)	4	43	2	3	1	3	7	49
COMPILING FIRE, FIRE-WEATHER STATISTICS	5	16-1/2	2	12	1	2	8	30-1/2
FIREWEATHER FORECASTING RESEARCH	7	42	--	--	--	--	7	42
FIRE FUELS AND HAZARD REDUCTION								
FUEL STUDIES	3	18	1	2	--	--	4	20
SLASH DETERIORATION, DISPOSAL	2	12	2	9	3	11	7	32
CHEMICAL BRUSH CONTROL	1	2	--	--	--	--	1	2
FIRE PREVENTION								
MAN-CAUSED	1	14	2	21	1	1	4	36
LIGHTNING-CAUSED	5	60	1	15	1	2	7	77
FIRE CONTROL								
PLANNING AND METHODS (Behavior, etc.)	3	8	2	3	1	1	6	12
AIR ATTACK	1	14	--	--	--	--	1	14
CHEMICAL ATTACK	1	14	--	--	--	--	1	14
FIRE EFFECTS, USE	3	5	--	--	--	--	3	5

I am sure that we don't need less lightning research. This work is still below the level that will produce new knowledge and techniques fast enough. And it is plain that we do need to start real research into the human side of the picture. People are pretty much the same everywhere. Any investigation by any agency into why people start fires would help everyone. But the way it is now, prevention projects are so scattered over the West that there is no chance for researchers to combine forces and get results faster. Another thing, too--these projects are part-time shows.

It would probably help a lot in man-caused prevention research to establish some kind of direct communication line between present projects. They don't have that advantage now. Skyfire and the California groups working in lightning prevention have done a good job here, and the results show it.

But the research area that seems to suffer most from lack of concentration and intensity of effort is fire use and effects. The 3 unit projects shown are in 3 different parts of the west and collectively account for only 5 man-months--not even 1 man full time. There must be a reason for this. Maybe some one of you can tell us what it is.

Basic research into the elementary laws of combustion and fire extinguishment has one federal unit project in California and one State unit at Salem, Oregon. We've got 17 man-months of time we can put in on it, but Oregon only has one.

Many projects don't even have one full-time man. Very few studies can go very far or very fast that way. Chasing unknowns all by yourself is a slow and a frustrating business.

Down in California this year we put a lot of brain and more than a little brawn from a lot of different agencies and industries on two projects you've probably all heard about. We came up with a couple of things that we think everybody will be able to use in a rather short time. These two belong under the fire-fighting research category. The first is the lab and field testing of borates as fire-retarding chemicals. The second is the use of air tankers to put the borate and water on the fire before it gets a chance to go any place. I'll let movies speak for both. They show what the borate looks like, how it retards fire, how it's mixed, and how the air tankers put it on.

Air tankers were used on 25 fires this year, dropping some 150,000 gallons of sodium calcium borate and water. On 16 of the fires they were the deciding factor in control.

There's a lot of perfecting to do yet but these are 1956 contributions that not only can be used in 1956 but by 1960 should be well-established tools.

The obvious lesson is that western fire research could stand much more use of the task-force approach. We need to apply the power, imagination, and speed of teams from many scientific interest toward a common goal.

But we are too widely scattered geographically and in the kinds of research. There is little opportunity to intensify study or concentrate on problems for fast results. Fifteen organizations in the 11 western states and Canada are doing some kind of research and equipment development. Only 2 of those have a concentration of man-power. The most in one place total 9. Together they work 500 man-months on 121

unit projects. That works out to 3 men and 8 projects per organization. But as you have seen, most of these unit projects are minor. It's pertinent, too, that many of the problems of major importance have no more men working on them than the minor ones have. As an example, all research that can be classed as basic to the future understanding of fire behavior has 1-1/2 men. So do head lamps for tractors. Everything is spread thin.

What does this mean?

Basic research is starved. So is prevention, which should lead them all in importance. One kind of research is missing altogether--a very necessary kind, too, if fire fighting is ever to have a "new look"--and that is operations research. Of all research effort, this probably offers the greatest possibility of revolutionizing fire control.

Meeting these needs will be helped, I'm sure, by coordination, by our new Western Fire Research Council, but there is one tool that they will need to do the job. Good coordination is not possible without adequate current information. Western forest protection and research groups need to develop new, positive, and fast channels of communication so that everyone can know what is going on everywhere else at all times. Our first small survey demonstrated the difficulty of getting information quickly. We seem to be the most word- and paper-poor business in the United States. There is only one publication devoted exclusively to forest fire in the country and that comes out only quarterly. It must serve all of the United States in four issues a year. There must be a whole lot more to say than that. There's two years' worth right here in this survey and we can't wait two years. There is no publication that serves western fire alone.

The Western Fire Research Council has three challenges. The first is to coordinate the fire research programs we now have in order to speed them up; the second is to stimulate new critically needed research; and the third is to sponsor faster, more positive communication in order to get new knowledge into use faster. The three together can spell better control of fire in the West.